

beverage-forming component comprising tea, coffee, chocolate or malt.

REMARKS

Claims 1-18, as amended, and new claims 20-26 appear in this application for the Examiner's review and consideration. Claim 19 has been cancelled.

Claim 1 has been amended to recite that the method is for preparing an aroma-containing component which releases an aroma having increased amounts of desirable flavor or sensory characteristics during preparation of a food or beverage product, and to recite that the stabilizing agent is a nucleophile that contains at least one atom of sulfur or nitrogen providing at least one lone pair of electrons for reaction, and that the stabilized aroma-containing component is separately stored prior to combining it with a further component of a food, beverage, food-forming or beverage-forming material and optionally with a liquid to form a product for consumption. Claim 14 has been amended to recite a food product comprising a food, beverage, food-forming or beverage-forming material and an aroma-containing component which is treated with a nucleophile that contains at least one atom of sulfur or nitrogen that provides at least one lone pair of electrons that chemically interacts with compounds associated with the aroma-containing component to release an improved aroma compared to untreated aroma-containing components. Support for these changes is provided by the specification and original claims such as claim 2. Claim 2 has been amended to be consistent with claim 1. The new claims re directed to preferred embodiments that are disclosed in the specification. As no new matter has been introduced, the entry of these claim changes at this time is warranted.

The office action notes that certain copending applications disclose similar subject matter and that a clear line of demarcation needs to be maintained between these applications. Applicants submits that this has been done since the claims of this application are directed to a method for preparing an aroma-containing component which releases an aroma having increased amounts of desirable flavor or sensory characteristics during preparation of a food or beverage product and to enhanced food products, while those of application no. 10/661,3972 are directed to compositions, namely, a stabilized aroma-containing component and the combination of the component with a foodstuff where the component is separately stored from the foodstuff those of application no. 10/661,388 are directed to a process for providing a stabilized aroma-containing component. It is respectfully submitted that the claims of these applications would have been subject to restriction if presented in a single

application, and applicants has simply filed separate applications to separately pursue patent protection for these embodiments.

The claims were rejected for lack of enablement for the reasons set forth in the office action. While the Examiner's interpretation of the claim term is correct, applicants have now amended claim 1 as noted above to emphasize that the stabilizing agent is a nucleophile that contains at least one atom of sulfur or nitrogen for providing at least one lone pair of electrons for reaction. This enables the stabilizing agent to chemically interact with undesirable compounds to form a stabilized aroma-containing component which either retains a significant portion of one or more of the desirable flavor or sensory characteristics of the aroma in the aroma-containing component during storage, or reduces off flavor generation during storage of the aroma-containing component. The specification includes a number of examples of these nucleophiles, including SO₂, a sulfite or a substance that contains or generates a sulfite, a thiol, an amine or an amino acid, and in particular, cysteine or glutathione or their salts or an enzyme. In view of this amendment, the enablement rejection has been overcome and it should be withdrawn.

The claims were rejected over either of Reich US patent 3,421,906 or Belrhliid et al. ("Belrhliid") European patent application 963,706 for the reasons set forth on pages 3-4 of the action.

Before addressing these rejections, a brief review of the presently claimed invention may prove helpful. The invention relates to a method for preparing an aroma-containing component which releases an aroma having increased amounts of desirable flavor or sensory characteristics during preparation of a food or beverage product. This method comprises treating the aroma-containing component with an aroma-improving agent of a nucleophile that contains at least one atom of sulfur or nitrogen for providing at least one lone pair of electrons that chemically interacts with compounds associated with the aroma-containing component. This reaction results in the generation of an improved aroma that contains (a) increased amounts of compounds that provide or improve the desirable flavor or sensory characteristics of the aroma or (b) reduced amounts of compounds that suppress desirable flavor characteristics or contribute to or generate undesirable characteristics. Next, the treated aroma-containing component is stored prior to contact with a further component of a food, beverage, food-forming or beverage-forming material and optionally with a liquid to form the food or beverage product for consumption so that the product will contain an improved or enhanced aroma compared to an untreated aroma-containing component.

Another embodiment of the invention relates to a food product comprising a food, beverage, food-forming or beverage-forming material and an aroma-containing component which is treated with a nucleophile that contains at least one atom of sulfur or nitrogen that provides at least one lone pair of electrons that chemically interacts with compounds associated with the aroma-containing component to release an improved aroma compared to untreated aroma-containing components. The improved aroma has increased amounts of desirable flavor and sensory characteristics, decreased undesirable flavor or sensory characteristics, or both. The treated aroma-containing component is stored prior to contact with a further component of a food, beverage, food-forming or beverage-forming material and optionally with a liquid to form a product for consumption which product so that the product will contain an improved or enhanced aroma compared to one prepared with an untreated aroma-containing component.

In contrast, Reich discloses a method for treating roasted coffee to avoid staling. That method includes the treatment of coffee with sulfur dioxide or a salt that releases sulfur dioxide in combination with ammonia to remove acrid sulfur dioxide odors. This treatment is performed to stabilize coffee flavor and aroma so that without introducing objectionable aromas or odors. This results in the retention of the desirable coffee flavors and aromas while also preventing staling of the coffee during packaging and storage. To do this, Reich adds sulfur dioxide vapor directly to the coffee, such as by introducing it into the grinding chamber of the mill used to grind roast coffee either along with or preceded by a stream of ammonia. Thereafter, Reich subjects the treated coffee to carbon dioxide stripping to remove the sulfur dioxide and ammonia vapors before packaging the treated product.

The present invention, as defined in claim 1, is patentable over Reich because Reich does not disclose a method for preparing an aroma-containing component which releases an aroma having increased amounts of desirable flavor or sensory characteristics during preparation of a food or beverage product which results from treating the aroma-containing component with an aroma-improving agent and storing the treated aroma-containing component prior to contact with a further component to form a food or beverage product. Accordingly, the stabilizing agent is present with the aroma-containing component when the stabilized aroma-containing component is combined with a further component of a food, beverage, food-forming or beverage-forming material and optionally with a liquid to form a product for consumption. Instead, Reich either (1) combines a stabilizing agent such as sulfur dioxide with the ground coffee to treat it, but does *not* form a beverage or food product from

a stabilized aroma-containing component, or (2) treats the coffee and then *removes* the agent prior to packaging and subsequent formation of a beverage. The present invention provides significant improvements in the flavor and aroma of the resulting product by maintaining the stabilized aroma-containing ingredient (i.e., the combination of the stabilizing agent and the aroma-containing ingredient) during packaging and storage so that, when a beverage or food is formed with the stabilized aroma-containing ingredient, improved and enhanced aroma is obtained in the product compared to products prepared with an unstabilized aroma-containing component.

Reich illustrates the drawbacks in his invention by noting in Example 1 that upon several weeks storage, the flavor and aroma of the treated sample was preserved *although somewhat diminished*. The present invention avoids the diminishment of flavor and aroma by packaging the stabilized aroma-containing ingredient until needed for the preparation of a product for consumption so that optimum aroma characters can be obtained in the product. Thus, claim 1 is patentable over Reich for these reasons.

Claims 12, 16-18, 23 and 26 are further patentable over Reich since the specific stabilized aroma-containing ingredients of those claims are not disclosed in Reich. As noted above, Reich does have a stabilizer in contact with ground coffee at one point in the process, but he either does not use that combination to form a beverage for consumption or he separates out the stabilizing agent prior to packaging the coffee which is later used to make a beverage for consumption.

For coffee aroma, for example, the addition of the stabilizing agent of the present invention has been found to extend the shelf life to allow the aroma, after storage for extended periods of time, to retain a flavor which is reminiscent of freshly brewed coffee in various coffee beverages that are reconstituted after storage of the aroma. It is believed that several mechanisms are occurring to achieve the stability and increased storage life of the fresh flavor, with one or a combination of these mechanisms occurring simultaneously to achieve the improvements:

the stabilizing agent reacts with carbonyl groups contained in compounds such as aldehydes or ketones to form adducts which do not react with the other coffee aroma compounds to decrease the overall flavor characteristics;

the stabilizing agent cleavages disulfide bonds to promote levels of desirable free thiols;

the stabilizing agent acts as an oxygen scavenger to prevent deterioration of the flavor characteristics of the coffee aroma due to oxidation;

the stabilizing agent acts as an anti-oxidant to prevent free radicals and other oxidizing compounds from deteriorating the flavor characteristics of the aroma due to oxidation;

these endogenous antioxidant activities preserve thiol and pyrrole degradation over time;

the stabilizing agent reduces or controls undesirable browning, polymerization, or condensation reactions, or

the stabilizing agent binds carbonyls during storage at least some or all of which are released upon reconstitution into beverage.

In addition, the presence of aldehydes, such as acetaldehyde, causes the flavors to degrade. The stabilizing agent reacts with the aldehyde to form aldehyde derivatives that do not negatively impact the stability of the coffee aroma-containing component. For this reason, C-nucleophiles, such as 1,3-dicarbonyl compounds and various thiazolium salts are particularly useful stabilizing agents. For example, thiamin (Vitamin B1) is known to react with aldehydes to form aldehyde derivatives component that do not deleteriously affect the coffee-aroma containing component.

In conventional non-treated or non-stabilized coffee aroma, the amounts of methanethiol and pyrrole typically degrade or diminish to almost undetectable levels over the course of several months when the components are stored at room temperature. Even if the stabilizer is added to the final product that contains a non-stabilized aroma containing component, these volatiles are substantially degraded because the stabilizer is added to the whole food matrix and is integrated therewith so that less of it is available to interact with the aroma-containing component. In contrast, the treated or stabilized aroma-containing components of the invention are characterized by a significantly reduced degradation profile compared to the conventional components. The methane thiol and pyrrole levels remain at more than 30% of the initial levels after storage at ambient temperature over a period of at least 6 months.

Claim 14 is patentable over Reich for the same reasons as claim 1. In addition, Reich does not disclose a food provided by a food, beverage, food-forming or beverage-forming material and the previously described stabilized aroma-containing component, wherein the stabilized aroma-containing component is stored separately from the other material. As

noted, Reich removes the stabilizer from the product prior to storage, whereas applicants store the stabilized component separately from the food or beverage forming component prior to formation of the product so that, upon preparation, the unexpected advantages in flavor and aroma can be achieved. Thus, all rejections based on Reich have been overcome and should be withdrawn.

Belrhld discloses a precursor mixture of flavorings that includes at least one polysulfide and at least one non-volatile source of sulfur having at least one sulfhydryl group. The precursor mixture generates an aromatic note when it is heated due to the formation of thiols. The polysulfide is present in an amount sufficient to generate a thiol when heated to provide a roasted or grilled aromatic note. The non-volatile source of sulfur includes at least one sulfhydryl group and is present in an amount sufficient to react with the polysulfide to form the thiol and release of the aromatic note when the precursor mixture is heated. Example 1 illustrates the addition of a precursor mixture of bis (2-furfuryl) dioxide and β -lactoglobulin to hot water (100C) with soluble coffee to form a flavored beverage.

Belrhld does not disclose that a stabilizing agent is present with the aroma-containing component and is stored prior to combining the stabilized aroma-containing component with a further component of a food, beverage, food-forming or beverage-forming material and optionally with a liquid to form a product for consumption. Instead, Belrhld discloses a precursor mixture of flavorings that generate a grilled note (or similar flavors) when heated. The present invention is instead directed at providing significant improvements in the *aroma* of the resulting product by maintaining the stabilized aroma-containing ingredient (i.e., the combination of the stabilizing agent and the aroma-containing ingredient) during packaging and storage so that, when a beverage or food is formed with the stabilized aroma-containing ingredient, improved and enhanced aroma is obtained in the product compared to products prepared with an unstabilized aroma-containing component. One of ordinary skill in the art would recognize the difference between the use of a flavoring agent for taste improvement compared to the stabilization of an aroma-containing ingredient to provide aroma improvement, so that the rejection of claim 1 over Belrhld should be withdrawn.

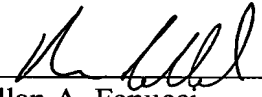
In addition, claims 12, 16-18, 23 and 26 are further patentable over Belrhld since the specific stabilized aroma-containing ingredients of those claims are not disclosed in Belrhld. Belrhld simply does have a stabilizer in contact with coffee, tea, malt or the other aroma-containing components recited in those claims .

Claim 14 is also patentable over Belrhlid. Belrhlid does not disclose a food made by a food, beverage, food-forming or beverage-forming material and the previously described stabilized aroma-containing component wherein the stabilized aroma-containing component is separately stored from the material until the combination is to be used to prepare a food or beverage product for consumption. As noted, Belrhlid is not concerned with the stabilization of an aroma and instead is concerned with flavor modification when heat is added to a product. In contrast, applicants provide a combination where a separately stored stabilized aroma-containing component is provided with a food or beverage forming component so that, upon preparation, unexpected advantages in aroma can be achieved. When aroma-containing components such as coffee aroma are stabilized as taught by the present invention, significant benefits are achieved as explained above and as further explained in the specification. In view of the preceding, it is respectfully submitted that all rejections based on Belrhlid have been overcome and should be withdrawn.

Accordingly, the entire application is now believed to be in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree that all claims are patentable, then a personal or telephonic interview is respectfully requested to discuss any remaining issues in order to expedite the eventual allowance of this application.

Respectfully submitted,

Date: 9/10/04


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